

# Monterey Shale Continues to Tempt and Tease

**Louise S. Durham, American Assoc. of Petroleum Geologists Explorer, 2-1-13**

It has a very public profile. A major Hollywood film actor, for example, is starring in a newly released movie focused on hydraulic fracturing – and it's not the first film of this type.

But Californians often appear to be unaware of something that petroleum geologists and others connected to the industry know to be true: The state has been producing oil – and a lot of it – for more than 100 years.

The bulk of these hydrocarbons originated in the Miocene-age Monterey shale in southern California.

The Monterey has sourced almost all of the oil in the state. This includes producing giant fields such as the Kern River, Elk Hills and Midway-Sunset among others.

This formation has been estimated to contain more than 500 billion barrels of oil-in-place. Production is from both conventional reservoirs and from the shale itself.

An all-out effort to ramp up E&P in this humongous resource likely would go far to assuage the state's considerable unemployment rate and ongoing budget shortfalls.

Long Beach-based consulting geologist and AAPG member Don Clarke commented that every oil and gas sector job supports four additional jobs.

“The potential is enormous for jobs to be had in the LA Basin,” he noted.

Money does talk.

California Gov. Jerry Brown caused quite a kerfuffle in an apparent effort to ease some of the more stringent regulations placed on the industry in this green-leaning state, where some segments of the populace consider fossil fuels to be somewhat less desirable than a deadly plague.

The governor dismissed a top state regulator and his deputy over a dispute wherein the official refused to honor Brown's request to ease key requirements for companies wanting to produce oil in California. Reportedly, every injection project is no longer subjected to a “microscopic” review before obtaining a permit.

“The regulatory area looks much better than it used to be,” said geologist Richard Behl, an AAPG member and professor in the department of geological sciences at California State University Long Beach (CSULB).

“There's been some incredible progress,” he said. “The companies might have to work hard with the government on regulations and permits, but they are getting permits.”

## **Huge Potential ...**

Behl heads the industry-sponsored MARS consortium (Monterey And Related Sediments) at CSULB.

The current renewed interest in the Monterey is evident to Behl, who said that even as a professor he receives numerous calls from landmen and companies who want to talk about getting into the Monterey.

recoverable shale oil resources in the onshore Lower 48 states.

“The numbers probably were overblown, but it was a simple method and had an essence of truth,” Behl said. “The truth is the Monterey has long been famous as an organic source rock for oil in California and, in many places, a naturally fractured reservoir.

“It’s much thicker than all other shale plays in North America, and the volume makes it huge,” he noted. “When you do simple calculations using organic content, volume, possible reserves, you come up with gigantic numbers.

“Most shale targets in North America are much less than 200 feet thick at the most, and I was at a place recently where the Monterey is 6,000 feet thick,” Behl said. “If there are places there where the organic matter and the rocks are buried deeply enough to generate (oil) and the rocks are not fractured enough to expel oil to be lost at the surface or into other traps, then that’s a vast area of targets.”

### **... But A Complex Challenge**

The current spate of renewed interest might be a no-brainer, but the Monterey play is no slam-dunk.

“The main uncertainty compared to a lot of the other plays is that the Monterey is highly deformed, and we don’t know how extensively fractured the rocks may be off of the tectonic structures where companies have been producing for years,” Behl emphasized.

“If it’s as fractured as the rocks in the higher parts of structures, maybe the oil is lost already and we’re too late,” he noted. “What this means is large areas of the Monterey formation that aren’t associated with the known structural and stratigraphic traps are now open to exploration.

“It’s up to us to come up with a model to find the places where the oil is still there.”

To say California geology is complex is an understatement.

In this region so deformed naturally by tectonic forces, oil is free to migrate, whereas it hasn’t migrated all that much in other shales.

The Monterey is an unconventional rock, yet so much of its historical production has been conventional in that the oil has been expelled via the fractures to migrate into conventional traps, e.g. sandstone.

Behl noted that in the Los Angeles area, the Monterey and its equivalent are the primary source of oil, but the reservoirs are much younger turbidite sands.

In other words, the formation is both a resource of migrated oil for conventional production and a reservoir for unconventional production. The reservoir rock itself produced in the Santa Maria Basin as far back as 1900.

Another unique feature of the relatively young Monterey is that it currently is generating oil with large areas being in the peak oil generation window. Some of the older Monterey fields have been in existence for fewer than one million years.

### **Technology and Transparency**

We're talking California, after all.

“The current state government has been specifically willing to work with industry, but this doesn't mean everyone is on board with enhanced techniques like fracing,” Behl noted, “or that all are writing off environmental responsibility.

“California is not unlike everywhere else where people are very concerned about what to them is the new concept of fracing and what it means,” he said.

“The general public is poorly informed and very concerned, and they need to understand what this actually entails,” he said. “They need to be convinced there is a proper amount of oversight and regulations for this, and that it's not a scary new technology that's going to ruin everything.

“I think the industry will deal with that ultimately.”

Wells have been hydraulically fractured in California – including the LA Basin – over the years. The “new” entails multi-stage fracturing commonly used/needed to economically produce shale zones.

“If you do a resource play, say, in the L.A. Basin, you would have to do multi-stage fracturing to make the basin really produce,” Clarke said, “and you would be very visible.

“There are seven million people living in the greater Los Angeles area, and you cannot be hidden,” he emphasized. “The industry will have to be very transparent, very visible.”